

Project title | **Development of Solid-State Marine Radar**

Institutions : Kodens Electronics Co., Ltd. and Toyo Tech Industry Inc.

Research outline

Objective

In the field of marine radars, which are used to ensure safety during ship navigation, there has been demand for developing a "solid-state marine radar," which uses a solid-state power amplifier to output microwaves to effectively utilize frequencies and reduce maintenance costs. In recent years, solid-state power amplifiers have become capable of high power output, as observed in GaN (gallium nitride) power amplifiers, which is a wide bandgap material. However, at present these remain too expensive to equip on small ships. This study focuses on cost reduction, with the goal of developing a solid-state marine radar that can be marketed as a commercial device while meeting the criteria for performance, price, and dimension. High-power solid-state power amplifiers can be applied to various systems. We believe that the results from this study will be applicable in a variety of areas, including aerospace.

Contents

Based on the S-band 1-kW solid-state power amplifier equipped on the JAXA's Uchinoura Space Center, and X-band 20-W solid-state power amplifier equipped on the deep-space probe PROCYON, we continue making modifications to achieve lower costs, focusing on the following three points:

- 1) A design from the material level
Instead of using commercially-available, versatile devices, we attempt to reduce raw material costs by designing specific to the product needs from the material level.
- 2) Improving efficiency and reducing size
Reduce the performance required to peripheral equipment, such as power supply circuitry and frame. Pursue higher efficiency and smaller size to reduce total amplifier cost.
- 3) High performance reproducibility
Designs based on high performance reproducibility to reduce labor during mass production and ensure reliability.

